Environmental Science

AN IMPROVED NUMERICAL MODEL FOR DETERMINING CHEMICAL REACTION RATES

Uri Manor, Scott Rutherford*
Saint Louis University
221 N. Grand
St. Louis, MO, 63103
manoru@slu.edu

A robust numerical procedure for biogeochemical interpretation and analysis of measured concentration profiles has been developed by Berg et al.[1] The model utilizes an approximation of Fick's Second Law to find constant reaction rates in equally spaced/sized ranges of depth (a.k.a.'zones'). This method works well for profiles several centimeters deep, where the resolution and complexity of behavior is uniform throughout the profile. However, it is limited when attempting to analyze profiles several hundred meters in depth, in which case a model that can adjust accordingly to changes in sampling resolution and profile complexity (i.e. differently spaced zones) would be more useful/accurate. Therefore, the concepts of the old model have been used and modified to make a new model that allows differently spaced and sized zones throughout the profile. It is evident that this approach is flexible enough to handle the complexity of profiles in marine sediments several hundred meters below the ocean floor. This tool enables researchers to indirectly detect/analyze biologic communities in extreme environments, and therefore is useful to astrobiologists, as well as oceanographers.

References

Berg, P., Risgaard-Petersen N., and Rysgaard S., Interpretation of measured concentration profiles in sediment pore water, in *Limnol. Oceanogr., 43(7), 1998, 1500-1510 ©1998, by the American Society of Limnology and Oceanography, Inc.*